Jinpei Guo

Homepage | +86 13023252570 | guo_jinpei@163.com

EDUCATION

Shanghai Jiao Tong University   Shanghai, China
Bachelor in Computer Science and Technology, GPA: 4.0/4.3, Top 5/109   Sep. 2020 – Present
Honorary Bachelor of Zhiyuan College   Sep. 2020 – Present
Advanced Math Courses: Linear Algebra A+, Mathematical Analysis A+, Discrete Mathematics A+, Probability and Statistics A, Mathematical Methods in Physics A, Mathematical Foundations of Computer Science A
Core Computer Science Courses: Operating Systems A+, Project Workshop of Operating System A+, Computer System Architecture A, Experiments in Computer Organization A, Computer Organization A+, Algorithm and Complexity A, Computing Theory A, Introduction to Cryptology and Information Security A
Machine Learning and Artificial Intelligence Courses: Practice of Autonomous Localization and Navigation Algorithm on Mobile Robot A+, Artificial Intelligence A+, Digital Graphics Processing A, Machine Learning A+, Introduction to Data Science A+

SKILLS

- Languages: TOEFL (107/ 120), GRE (330/340).
- Programming Skills: C/C++, Python, Matlab, etc.
- Machine (Deep) Learning Related Knowledge:
    - PyTorch (proficient), TensorFlow (able to read).
    - Familiar with Transformer / Generative Model algorithms and widely-used network architectures.

ACADEMIC PROJECTS

- *Guided Diffusion Models For Combinatorial Optimization Problem*   Apr. 2023 – Sept. 2023
  Advised by Prof. Junchi Yan   *Shanghai Jiao Tong University*
    - Proposed a framework based on diffusion models which introduces the gradient of the loss as the guidance to generate solutions for the TSP and MIS problems, with rewriting strategy to alleviate the local minima.
    - Achieved SOTA performance compared with learning-based models, outperformed some heuristic solvers, reduced the solving time by one order of magnitude compared with advanced heuristic solvers (e.g. from 1.5h to 4min).
- *Benchmarking and Advancing SAT Solving with Graph Neural Networks*   Apr. 2023 – Aug. 2023
  Advised by Prof. Xujie Si   *University of Toronto*
    - Built the first comprehensive and systematic ML-scaled SAT benchmarks encompassing seven different SAT instance generation strategies to evaluate the SAT solving abilities of ML models, especially for GNNs.
    - Proposed a novel interpretation of the GNNs' SAT solving strategy analogue to the local-search heuristic solvers and verified our proposition with empirical results on our benchmarks.
- *Learning Reliable Interpretations with SATNet*   Jan. 2023 – Jul. 2023
  Advised by Prof. Xujie Si   *University of Toronto*
    - Proposed SATNet*, built on a differentiable MaxSAT solver named SATNet, to learn interpretable and reliable rules of logical puzzles such as Sudoku and Rubik's Cube by representing the CNF formula as a parametric matrix and applied Gurobi as the backend solver to solve weighted Max2SAT.
    - Proposed two theories to verify the equivalence of different expressions of SAT and Max2SATVerified our learned rules on extensive experiments including Sudoku, Parity Function, Stream Transformation, etc.
- *Graph Matching Transformers*   Sept. 2022 – Feb. 2023
  Advised by Prof. Junchi Yan   *Shanghai Jiao Tong University*
    - Proposed QueryTrans, a backbone specially designed for graph matching (GM) tasks which introduced key-point patches and cross-attention mechanism to better capture the local information of key-point in the graph.
    - Applied the attention-mechanism to the backend module in response to the combinatorial nature of GM to better capture the underlying structure.
    - Our proposed backbone improved all the existing frameworks performance on widely used benchmarks of GM, and our newly proposed method achieved SOTA on most of the benchmarks such as Pascal VOC and Spair-71k
- *Chemical Compounds Retrosynthetic Planning*   Apr. 2023 – Sept. 2023
  Advised by Prof. Shikui Tu   *Shanghai Jiao Tong University*
    - Course project for CS3308-Machine Learning. Reproduce the work: Retrosynthetic Planning with Retro*, replacing A* search with MCTS to improve the searching efficiency and robustness by a large margin.

RESEARCH PAPERS

1. **Learning Reliable Interpretations with SATNet**
   NeurIPS 2023
   Zhaoyu Li, Jinpei Guo, Yuhe Jiang, Xujie Si

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2. **From Distribution Learning in Training to Gradient Search in Testing for Combinatorial Optimization**
   NeurIPS 2023
   Yang Li, Jinpei Guo, Runzhong Wang, Junchi Yan
3. **G4SATBench: Benchmarking and Advancing SAT Solving with Graph Neural Networks**
   ICLR 2024, under review
   Zhaoyu Li, Jinpei Guo, Xujie Si
4. **Graph Matching Transformers**
   ICASSP 2024, under review
   Jinpei Guo, Shaofeng Zhang, Runzhong Wang, Chang Liu, Junchi Yan

INTERNSHIP

- **BioMap**   Sept. 2022 - Jan. 2023
  Research Intern   *Mentor: Jing Gong*
  - **End-to-End Protein Recognition:** Conducted extensive experiments to evaluate transformers on protein sequence detection. Proposed a pre-training method for transformers to capture the underlying structure of proteins.

TEACHING EXPERIENCE

- Teaching assistant of CS0501H - Data Structure (designed for ACM Honors class)   Feb. 2022 - Jun. 2022
  Prof. Yong Yu; Number of students: 48   *Shanghai Jiao Tong University*

AWARDS AND HONORS

- Chinese National Scholarship, twice (Top 1% in SJTU)   2022, 2023
- Shanghai Scholarship (Top 2% in SJTU)   2021
- Zhiyuan Honorary Scholarship, three times (Top 5% in SJTU)   2021, 2022, 2023
- Third Prize of "Knowledge and Practice Cup" in Shanghai College Students' Social Practice Competition and Advanced Individual in the Social Practice Group (Top 0.1% in Shanghai)   2021
- Silver Medal of China Collegiate Algorithm Design & Programming Challenge Contest (Top 10% in Competition) 2021
- The Second Prize in the Chinese Physics Competition (Top 10% in Shanghai)   2021